

What is claimed is:

1. A composition for planarizing or polishing a surface comprising (a) a liquid carrier, and (b) solids comprising about 10-100 wt. % purified clay abrasive particles, based on the total weight of solids in the composition, said clay abrasive particles having a particle size such that at least 90% of the particles (by number), when slurried in water, have a particle size in the range of about 0.002 μ m to about 10 μ m.
2. The composition of claim 1 wherein the clay abrasive particles comprising a smectite clay.
3. The composition of claim 2, wherein the clay abrasive particles are selected from calcium smectite clay, ammonium smectite clay or a combination thereof.
4. The composition of claim 1, wherein the solids are present in the composition in an amount of about 0.1 to about 40 wt. % of the composition.
5. The composition of claim 3, wherein the carrier is water.
6. The composition of claim 2, further including a chemical accelerator selected from a peroxide, a sulfate, a persulfate, or a nitrate.
7. The composition of claim 6, wherein the a chemical accelerator is selected from the group consisting of hydrogen peroxide, ammonium persulfate, iron (III) nitrate, and hydroxylamine nitrate.
8. The composition of claim 1, wherein the clay is selected from the group consisting of a smectite clay; a kaolinite clay; a serpentine clay; a Pyrophyllite clay; talc, mica, and a synthetic clay.
9. The composition of claim 8, wherein the clay is selected from the group consisting of Beidellite; Nontsonite; Volkonskoite; Saponite; Hectorite; Halloysite; Kaolin; Serpentine clays, such as Lizardite; Amesite; Chrysotile; Pyrophyllite; Talc; Illite; Vermiculite; a synthetic smectite; Japonite; and a combination thereof.

10. The composition of claim 1, wherein the clay is any clay except for kaolin and diatomite.

11. The composition of claim 1, wherein the clay has a particle size in the range of 0.5 μ m to 10 μ m.

12. The composition of claim 11, wherein the clay has a particle size in the range of 0.5 μ m to 5 μ m.

13. The composition of claim 12, wherein the clay has a particle size in the range of 0.8 μ m to 4 μ m.

14. A method of planarizing or polishing a surface comprising contacting a surface with a composition comprising (a) a liquid carrier, and (b) solids comprising about 10-100 wt. % of ion-exchanged smectite clay abrasive particles, based on the total weight of solids in the composition, wherein about 90% or more of the abrasive particles (by number) have a particle size in the range of about .02 μ m to 20 μ m,

wherein said ion-exchanged smectite clay abrasive particles are prepared by forming a mixture of the smectite clay in water; adding a water-soluble salt to said water, said water soluble salt capable of solubilizing to provide exchange cations in said water, said exchange cations selected from the group consisting of ammonium cations, any alkali metal cations and alkaline earth metal cations except for lithium or sodium; ion-exchanging said exchange cations for exchangeable cations in the smectite clay to form an ion-exchanged smectite clay

filtering the water, containing sodium ions, from the mixture of the ion-exchanged clay and the water by flowing the mixture of ion-exchanged clay and water over a hollow-fiber tangential flow filtration apparatus to separate a majority of the sodium-containing water from the ion-exchanged clay.

15. The method of claim 14 wherein the separated, ion-exchanged clay is dried, re-wetted with water and again filtered from the added water, containing additional sodium ions, by flowing the mixture of ion-exchanged clay and the water over a hollow-fiber tangential flow filtration apparatus to separate a majority of the sodium-containing water from the ion-exchanged clay.

16. The method of claim 14, wherein the surface is an integrated circuit, a memory disk, or a rigid disk surface.

17. The method of claim 14, wherein the composition further includes a chemical accelerator selected from a peroxide, a sulfate, a persulfate or a nitrate.

18. The method of claim 14, wherein the chemical accelerator is selected from the group consisting of hydrogen peroxide, ammonium persulfate, iron (III) nitrate, and hydroxylamine nitrate.

19. The method of claim 14, wherein sufficient cations are added to the mixture of smectite clay and water to provide complete exchange of the cations for the exchangeable cations in the smectite clay.

20. The method of claim 14, wherein the ion-exchanged smectite clay has a particle size in the range of 0.02 μ m to 10 μ m, when slurried in water.

21. The method of claim 20, wherein the ion-exchanged smectite clay has a particle size in the range of 0.05 μ m to 5 μ m, when slurried in water.

22. The method of claim 21, wherein the ion-exchanged smectite clay has a particle size in the range of 0.1 μ m to 4 μ m, when slurried in water.